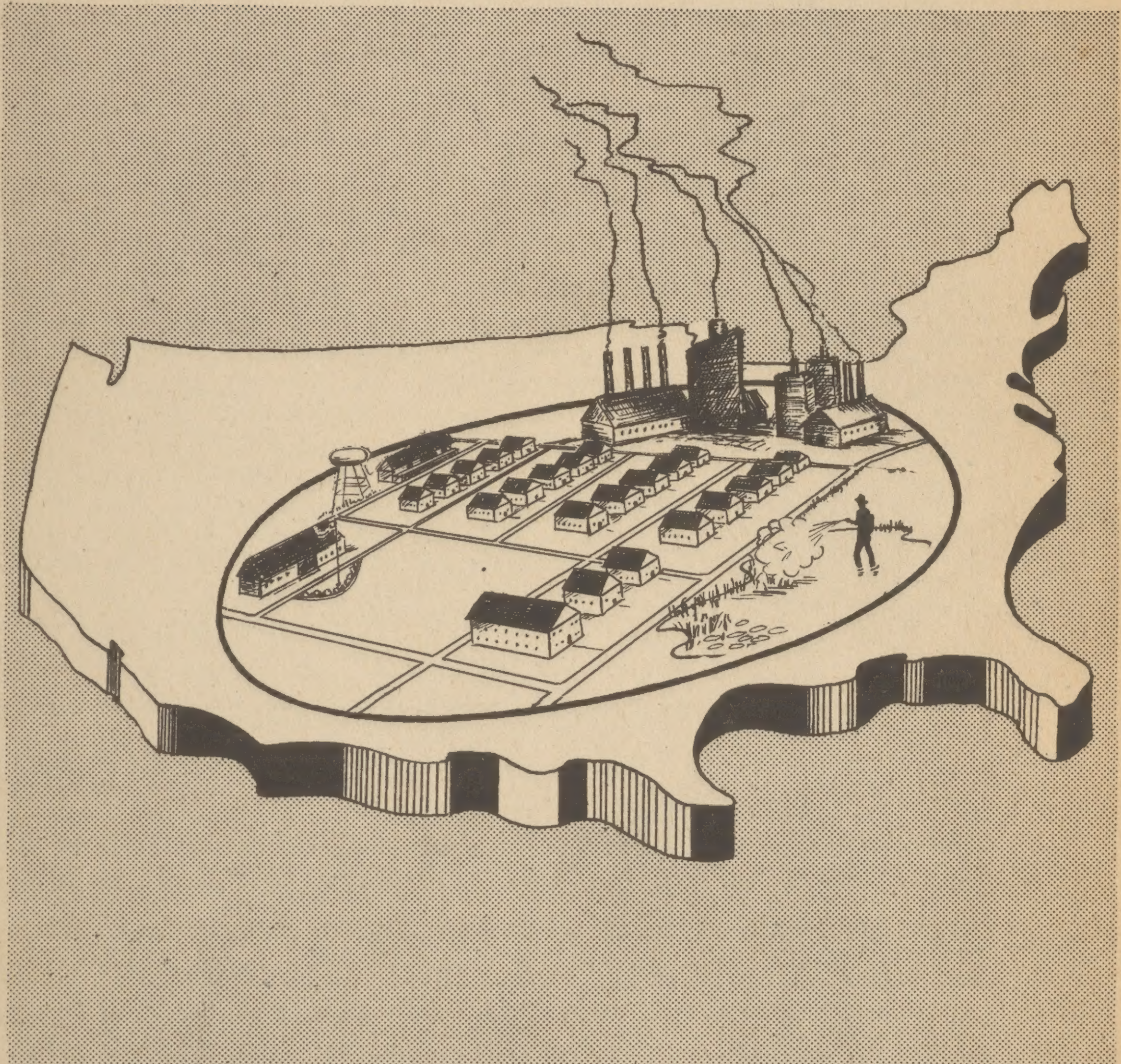
FIELD BULLETIN

IN-SERVICE TRAINING AND INFORMATION

MALARIA CONTROL IN WAR AREAS



ATLANTA, GEORGIA

DECEMBER, 1944

TIME - COST STUDIES ON LARVICIDING CREWS

FILARIASIS

FEDERAL SECURITY AGENCY U. S. PUBLIC HEALTH SERVICE

TABLE I

MCWA LARVICIDE, MINOR & MAJOR DRAINAGE WORK

NOVEMBER 1 - 30, 1944

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK: Larvicide Used: Oil Gals.	LARVICIDAL WORK: Larvicide Used: Paris Green Lbs.	LARVICIDAL WORK: Surfaces Treated Acres: Oiled	LARVICIDAL WORK: Surfaces Treated Acres: Dusted	DRAINAGE OPERATIONS: Clearing: Removal Surf. Veg. Acres	DRAINAGE OPERATIONS: Clearing: Stumping Grubbing Acres	DRAINAGE OPERATIONS: Cleaning Sq.Ft.	DRAINAGE OPERATIONS: New Ditching: Lin.Ft. Hand	DRAINAGE OPERATIONS: New Ditching: Lin.Ft. Mach.	DRAINAGE OPERATIONS: New Ditching: Dynamite	DRAINAGE OPERATIONS: New Ditching: Total Cu.Yds.	DRAINAGE OPERATIONS: Ditch Lining Placed: Lin.Ft.	DRAINAGE OPERATIONS: Ditch Lining Placed: Sq.Ft.	DRAINAGE OPERATIONS: Underground Drainage Lin.Ft.	DRAINAGE OPERATIONS: Fill Cu.Yds.	DRAINAGE OPERATIONS: Water Surf. Eliminated Acres	Total Man Hours
Alabama	5	92	---	---	---	---	4.2	0.1	450,660	5,532	---	---	1,298	---	---	---	---	6.2	5,856
Arkansas	15	92	---	---	---	---	99.5	---	701,447	3,556	320	---	853	812	11,123	---	---	22.0	21,676
California	4	30	90	---	15	---	8.7	---	113,305	7,580	3,500	---	14,137	---	---	---	---	904.5	3,974
Florida	16	111	3,747	61	315	55	22.0	2.1	804,097	47,646	---	---	6,128	---	---	---	7,267	21.7	30,461
Georgia	14	103	31	878	2	811	32.6	3.1	248,146	20,244	---	---	1,897	289	855	---	1,236	9.0	24,974
Illinois	--	54	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	432
Louisiana	8	86	8,021	---	338	---	87.8	2.4	1,330,498	22,147	---	---	5,912	---	---	---	21	6.5	46,399
Maryland	1	32	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,558
Mississippi	10	58	874	44	35	29	60.8	---	176,790	5,104	---	---	1,340	687	1,792	---	739	0.5	16,196
Missouri	4	22	---	---	---	---	1.8	---	8,000	9,140	---	---	1,052	---	---	28	---	25.2	3,228
New York	--	4	---	---	---	---	2.6	0.8	---	---	---	---	---	---	---	---	---	---	1,088
North Carolina	9	80	---	---	---	---	32.4	0.6	879,865	98,557	---	10,403	15,584	193	1,000	74	1,610	31.2	29,979
Oklahoma	5	62	---	---	---	---	26.4	---	42,978	12,455	---	---	994	---	---	---	---	14.3	7,865
Puerto Rico	7	22	2,537	9,113	252	5,443	12.8	---	676,980	9,013	---	---	1,863	126	---	---	---	---	53,334
South Carolina	18	114	883	45	65	30	68.4	0.4	1,498,964	31,581	---	---	7,569	36	144	1,924	305	23.3	54,447
Tennessee	3	67	1,399	---	63	---	54.0	2.7	18,576	2,089	---	---	443	594	1,485	725	72	3.6	9,078
Texas	13	178	6,855	10	359	9	113.6	1.1	496,408	30,823	750	---	8,185	515	2,060	---	72	29.4	39,050
Virginia	3	93	---	---	---	---	11.1	---	124,451	17,135	---	---	1,380	---	---	---	---	---	26,134
Total	135	1,300	24,437	10,151	1,444	6,377	638.7	13.3	7,571,165	322,602	4,570	10,403	68,635	3,252	18,459	2,751	11,322	1,097.4	376,729
October Total	162	1,375	142,691	17,300	7,719	10,571	798.4	38.4	8,814,142	334,714	14,630	30,162	56,851	2,824	13,437	4,601	3,413	100.8	433,396

TIME - COST STUDIES ON LARVICIDING CREWS

By P. A. San. Engr. J. G. Terrill, Jr.

Since its inauguration nearly three years ago, the MCWA program has grown in keeping with the increased number of areas for which protection was requested. Details of operation have been perfected in cooperation with the states. During this period certain operations have emerged as basic MCWA activities. These are hand dusting and hand spraying. Time-cost studies were initiated to determine unit costs and to discover significant inefficiencies in the standard MCWA practices. A brief summary of these studies is presented below. Detailed reports are available upon request.

AREAS STUDIED

Studies were made in five areas in different states. The areas included large and small civilian, military, and industrial populations. A variety of watered surfaces such as creeks, ditches, open canals, sink holes, and lime sinks were represented. The number of acres of breeding surface per sq. mile of protected area varied widely in the zones represented.

COLLECTION OF FIELD DATA

An observer was assigned to record all the details of operation of typical control crews. This observer was trained to record these data in a uniform manner on a standard form by minutes.

Larviciding production figures were based upon the area of treated water surface. Clearing production records were based on the square footage of vegetation removed. Where large scale accurate maps were available the areas were determined from these. However, adequate maps were often lacking so the areas were paced.

DEFINITIONS OF TIME CLASSIFICATIONS

A. Overhead Time — Unavoidable non-productive time used by the crew as a unit, such as: organizational period prior to leaving meeting place for job site in the morning, loading and unloading materials, filling sprayers and dusters, repairs and inspection for larvae by crew members.

B. Lost Time — Non-productive time lost on account of weather, poor operations planning, tardiness and neglect.

C. Vehicle Travel Time — Crew time required for the transportation of men, equipment and materials.

D. Foot Travel Time — Time required for the crew as a unit to walk to and return from the job site, or to walk from one job site to another.

E. Non-Productive Time — The summation of the Overhead, Lost, Vehicle Travel and Foot Travel Times.

F. Productive Time — Crew time used while actually operating the larviciding, clearing and cleaning equipment.

UNIT COSTS

Hourly wages were based on the annual Civil Service rates for the several laborer classifications, plus the standard overtime rates. It was assumed that each laborer would take advantage of all sick and annual leave. This presumption, together with the one holiday and Sundays, allowed for the calculation of the hourly wage on a basis of 271 eight-hour work days per year. Hourly wages for crew members on this basis were in the $0.70-0.80 range.

Cost of basic materials was considered as $0.08 per gallon for No. 2 fuel oil, $0.22 per pound for paris green, and $0.80 per 100 pounds for diluent.

The study revealed that gas, oil, depreciation and repairs totaled 4 to 6 cents per mile for 1½-ton trucks, and 3 to 4 cents per mile for ½-ton trucks. In the cost computations unit costs of 6 cents per mile for 1½-ton and 4 cents per mile for ½-ton trucks were used.

TABLE I.

TABULAR SUMMARY OF TIME COST STUDY

				AVERAGE COST IN DOLLARS																
				CREW LABOR COSTS								CREW EQUIPMENT & MATERIALS								
TYPE OF WORK	SYMBOL	STUDIES REPRESENTED IN ANALYSIS	AREAS REPRESENTED IN ANALYSIS	AVERAGE HOURLY WAGE	OVERHEAD TIME	LOST TIME	VEHICLE TRAVEL TIME	FOOT TRAVEL TIME	SUB-TOTAL NON-PRODUCTIVE TIME Σ fghi	PRODUCTIVE TIME	SUB-TOTAL LABOR Σ jk	OIL	PARIS GREEN & DILUENT	VEHICLE	OTHER	SUB-TOTAL NON LABOR Σ mnop	SUB-TOTAL CREW COST Σ lq	AREA OVERHEAD	STATE OVERHEAD	TOTAL Σ rst
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
PER ACRE																				
ACREAGE OILING	L-1	35	5	0.754	1.17	0.40	0.58	0.95	3.10	1.66	4.76	1.66	0	0.17	0.05	1.88	6.64	*(0.60) 1.34	0.60	*(7.84) 8.58
LINEAR OILING	L-2	48	5	0.752	2.08	0.73	1.39	1.51	5.71	4.51	10.22	3.33	0	0.55	0.12	4.00	14.22	1.17	1.09	16.48
ACREAGE DUSTING	L-3	11	3	0.788	0.31	0.18	0.21	0.22	0.92	0.58	1.50	0	0.35	0.05	0.02	0.42	1.92	0.19	0.21	2.32
CLEARING	C-6	10	2	0.733	2.74	0.61	3.51	1.51	8.37	18.65	27.02	0	0	0.82	0.31	1.13	28.15	4.33	2.11	34.59
PER 1000 LINEAR FEET																				
LINEAR OILING	L-2	48	5	0.752	0.12	0.04	0.08	0.09	0.33	0.27	0.60	0.20	0	0.03	0.01	0.24	0.84	0.07	0.06	0.97
CLEARING	C-6	10	2	0.733	0.26	0.06	0.33	0.14	0.79	1.76	2.55	0	0	0.08	0.03	0.11	2.66	040	0.19	3.25

L-1 OILING AREAS WIDER THAN 15 FEET WITH HAND OPERATED SPRAYERS ON FOOT.

L-2 OILING STRIPS NARROWER THAN 15 FEET IN WIDTH BY HAND ON FOOT.

L-3 DUSTING AREAS WIDER THAN 25 FEET BY HAND ON FOOT.

C-6 CLEARING LIGHT VEGETATION WITH BRUSH HOOKS ON LAND.

NOTE: ALL FINAL FIGURES ARE WEIGHTED AVERAGES

* NOMINAL FIGURE INSERTED TO INDICATE MORE NEARLY AVERAGE CONDITIONS, BECAUSE COMPUTED FIGURE IS UNDULY INFLUENCED BY A LARGE GROUP OF STUDIES FROM ONE AREA WITH AN UNUSUALLY HIGH AREA OVERHEAD.

Overhead calculations for the area and state include only the salaries of supervisory personnel and laborers specifically assigned to maintenance and storage activities. This was computed to a basic cost per field crew member working hour.

RESULTS

Results are summarized in Table I. Even casual observation of this cost summary discloses a striking total of non-productive labor and the study emphasizes the importance of operations planning at the foreman level. This is especially true of various types of larviciding where the total non-productive cost exceeds the productive labor cost. Overhead time as defined in this study is the largest item of non-productive time and a certain residual of this time will remain regardless of how efficiently the planning is carried out at the crew level. However, in many cases overhead can be significantly reduced by leaving headquarters promptly in the morning; by the foreman planning work two or three hours in advance during the day's operations; and by the Area Supervisor planning work two or three days in advance regarding jobsite, men, and materials. Importance of planning is illustrated by actual figures of two field crews, one under an efficient and the other under an inefficient foreman. Overhead can be further reduced by providing oil, storage and transportation equipment so one or two men can readily handle larvicide in large quantities, or by providing some means for improved handling of the 55 gallon drums.

EFFICIENT FOREMAN

Seven Man Crew

8:00	- Report for work
8:00	- Filling sprayers and planning work
8:07	- Travel toward jobsite
8:12	- Checking truck
8:15	- Travel to jobsite
8:19	- Harnessing sprayers
8:21	- Walking to watered surface
8:23	

Total Time to Initiate Larviciding - 2.8 Man Hours

A portion of the lost time could be prevented if the lunch period were extended officially from 30 minutes to an hour. The shorter lunch period is often stretched, even in the field, and is entirely inadequate for those who depend upon commercial establishments for their food.

The study discloses that the labor cost during vehicle travel time is three times greater than the cost of operating the vehicle. Theoretically the summation cost of labor "vehicle travel time" and vehicle operation could be reduced by providing more and smaller vehicles. This would permit fitting the size of gang more closely to the size of jobs handled on any particular working day. Observations reveal many occasions in which the full crew is carried to sites or on overhead missions when two or three of even only one is needed. Modifying factors which limit the full application of this principle to emergency activities are, of course, vehicle shortages, high labor turnover which prevents adequate training and the necessity of relying on unsupervised labor working in small detached groups apart from a foreman.

The present working attitude and competition for labor in general increase the total cost of operation and are often a factor in reducing labor productiveness during those periods which are labeled in this study as "Productive Time." This is particularly true when the men do not have some type of machinery to operate. They apparently lose interest in the work to some extent when equipped with a shovel, a ditch bank blade, or a potato hook.

INEFFICIENT FOREMAN

Seven Man Crew

7:30	- Report for work
7:30	- Planning day's work
8:10	- Travel to oil station
8:15	- Service trucks
8:36	- Travel to jobsite
8:45	- Filling sprayers
8:53	- Walking to watered surface
8:55	

Total Time to Initiate Larviciding - 9.92 Man Hours

Wages for malaria control operations have increased from a range of $0.50-1.50 per day during the thirties to 5.50-6.50 during war time. Under these circumstances basic control methods should be reevaluated since equipment and material costs have not increased in proportion to wages.

TABLE II

Cost in Dollars per Acre for Linear Oiling

	Good Foreman	Average Foreman
Overhead Time	$1.03	$2.08
Lost Time	0.00	0.73
Vehicle Travel Time	1.67	1.39
Foot Travel Time	1.35	1.52
Sub-Total Non-Productive	4.05	5.72
Productive Time	2.67	4.51
Sub-Total Labor	6.72	10.23
Oil	3.00	3.33
Vehicle	0.64	0.55
Other	0.12	0.12
Sub-Total Non-Labor	3.76	4.00
Total Crew Cost	$10.48	$14.23

A considerable amount of foot travel in almost every instance could be saved through the provision of a larger number of light, mobile trucks and the construction of simple access roads. This would often decrease foot travel time considerably while increasing vehicle travel time only slightly. Adoption of any practices and devices which would expedite the rate of refilling of hand dusters and sprayers or permit refilling closer to the points of application would also result in savings of foot travel and overhead time.

The relative cost of dusting and oiling ($2.32 per acre vs. $7.84 per acre) reemphasizes the considerable saving that can be made through the application of paris green wherever practicable and wherever labor can be properly taught and is willing to handle it. The latter point again reflects the necessity of foreman training, if operations are to be carried on efficiently. Of even greater importance, laborers can treat a larger surface of breeding area by dusting than by spraying. This is especially important on projects where labor scarcity or intermittent wet weather conditions make it difficult to cover all important breeding areas. In some projects where oil was used in preference to paris green, selection of oil appeared to have been motivated by antipathy to paris green on the part of operations personnel rather than by comparative trial. This antipathy appears to be based largely on reported dermatitis and the local opinion that little is accomplished unless culicines as well as anophelines are controlled.

Where a labor shortage exists, an increase in efficiency will not only reduce cost but will increase effectiveness of control as measured by vector densities.

A good foreman can decrease costs by careful planning to reduce overhead, lost time and foot travel time. In this way he helps the men to work more efficiently. Table II illustrates the possibilities for saving by a good foreman. These figures were taken from actual field crews.

Area and State headquarters costs reflect not only the high overhead load imposed on operations by over-all wartime restrictions in procurement of supplies and equipment, transportation and labor appointment, and those inherent in Federal procedure, but also the need for continuous evaluation of the administrative structure of the program at local and State supervisory levels.

CONCLUSIONS

Time-Cost studies of representative control operations on the MCWA program emphasize the importance of the foreman, as the key man in maintaining a high level of efficiency. Training and careful planning at this level can perhaps do more than any other single item to improve the control program. Greater resourcefulness at all levels, particularly on the part of area supervisory and foreman personnel, in the development of improved practices, technics and appurtenant equipment in hand larviciding work, and in the selection of larvicides is a primary need in improving effectiveness of control. Opportunity exists for the further displacement of hand with power larviciding equipment.

FILARIASIS

By Surg. (R) W. S. Boyd

Filariasis is a tropical and subtropical disease caused by nematode worms having a prelarval stage known as microfilaria. It is endemic in the Caribbean and Pacific areas where many of our men are now stationed. At present there is no filariasis transmission occurring in continental United States, but thousands of infected persons have returned and it is possible that some of these may become carriers. The public health significance of these carriers is debatable but physicians and public health officials should be armed with the latest information on the subject and should be alert to the possibilities of this interesting disease.

FILARIAL WORMS

Two species of filarial worms are responsible for most of the human filariasis throughout the world. These are *Wuchereria malayi* in the southeastern Oriental Region and *Wuchereria bancrofti* which is generally distributed. Bancroft's filariasis is of greatest concern at the present time.

LIFE CYCLE OF THE WORMS

The adult worms of *Wuchereria bancrofti* reside in the lymphatic system of man, and give rise to embryonic forms which emerge as thread-like motile microfilariae. The microfilariae make their way to the peripheral blood in which they circulate. In most sections of the world the microfilariae circulate in the peripheral blood only at night but in the Samoan area, where many American cases are contracted, no periodicity is exhibited. A day biting mosquito, *Aedes pseudoscutellaris* is the principal vector there.

From the peripheral blood stream the microfilariae are picked up by the female mosquito as she takes her blood meal. In the mosquito the microfilariae migrate from the stomach into the thoracic muscles where they become non-motile and develop into sausage-shaped rhabditoid larvae. After a period of several days' development in the thoracic muscles of the mosquito these larvae metamorphose into more delicate elongated filiform larvae. These filiform larvae then become motile and work their way into the proboscis sheath of the mosquito. The period of time required for this transition in the mosquito is approximately 14 days.

As the mosquito bites, these motile larvae emerge from the proboscis sheath and enter the puncture wound or penetrate the skin by their own activity. From the site of entrance these larvae migrate through the human body as they develop into mature worms. The biologic incubation period, or the period from the time the filiform larvae enter the skin until the time the adult worms begin to produce microfilariae, covers a period from 12 to 18 months or longer.

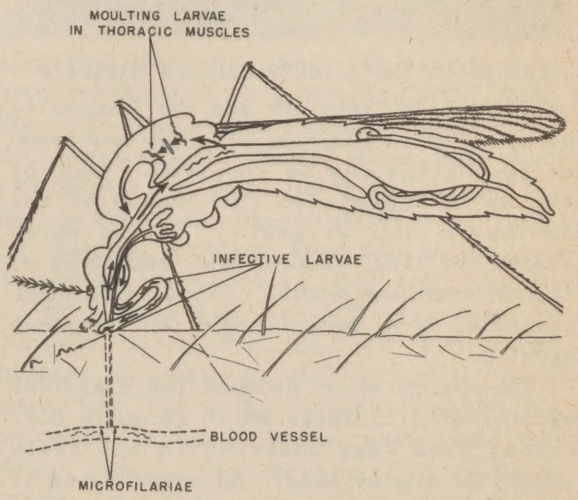


Diagram Showing Transmission of Filariasis

PATHOLOGY AND DIAGNOSIS

The migrating, immature worms cause the early pathology now being observed in recently infected military personnel. As the immature worms pass along the lymphatic channels and into the lymph glands inflammation and swellings occur. These

Larvae in Thoracic Muscles of Mosquito

Mature Worm in Lymph Gland of Human Host

swellings are transient and are frequently noted in the extremities although any group of lymphatics may be involved. Many of the worms migrate to the region of the spermatic duct or groin. In the early stages swelling, redness and tenderness of the scrotum may occur. Along with these symptoms, fever and allergic reactions may develop.

The mature worms produce the classical picture of filariasis which is quite different from that observed in the early stages of the disease. Advanced cases of elephantiasis develop only after a number of years of exposure and are caused by inflammation and fibrosis around the dead or dying adult worms with subsequent blockage of the lymph channels.

PREVENTION

Prevention of filariasis rests upon anti-mosquito measures. In this country *Culex quinquefasciatus* Say and *Culex pipiens* L., common house mosquitoes, and several other species are capable of transmitting the disease. In case an outbreak of filariasis occurs, routine mosquito control measures should be inaugurated, utilizing the anti-aegypti technique with slight modifications to include ground pools, catch basins, and other foul water breeding places. Since the flight range of these mosquitoes is greater than in the case of *aegypti*, satisfactory control would be more difficult to achieve.

SUMMARY

Although treatment is unsatisfactory, evidence indicates that the advanced stages of filariasis are not likely to develop unless the victim is subjected to repeated infections over a long period of time. In the present war, patients are removed from endemic areas when symptoms are first noted. The problem among such individuals is primarily a psychiatric one. Patients need to be assured that they will not develop elephantiasis of the scrotum or other parts of the body.

While large numbers of filariasis cases are returning to this country they are not likely to become infectious for months or years. Many may never develop microfilariae. Even if they develop circulating microfilariae, continued transmission of the disease requires a relatively large number of carriers exposed to high densities of efficient mosquito vectors under climatic conditions favorable to the development of microfilariae in the mosquito.

Public health authorities are keeping informed of latest developments in research on chemotherapy and on mosquito vectors and are disseminating knowledge of filariasis as widely as possible. In addition they are maintaining an attitude of watchful and alert waiting. If a sufficient number of proved filariasis carriers are observed in a locality where known vectors are prevalent, control measures should be initiated immediately.

HEADQUARTERS NOTES

CONFERENCE WITH TVA STAFF

The malaria control staff of the Tennessee Valley Authority met with MCWA representatives in Atlanta on January 11 and 12. Discussions were organized into the following professional interest groups: education and training, engineering, biology, and medical malariology. These discussions were followed by a general session at which coordination of malaria control developments of TVA and MCWA was considered.

SANTEE-COOPER SURVEY — SOUTH CAROLINA

Anopheles larvae and adults were found in December and January. The larvae were found in small lime sinks.

Data were secured on the equipment needed for diking and pumping on the Santee-Cooper Impoundment, including estimates of costs.

ARMY MALARIA SCHOOL

P.A. San. (R) Herbert Knutson returned on December 25th from the Army School of Malariology in Panama. The four weeks course included lectures, laboratory work, and field work, with special emphasis on training for officers and enlisted men destined for malaria control work overseas. The course was well organized and informative and included several new ideas that will be incorporated into the MCWA In-Service Orientation and Training Course.

DDT RESIDUAL SPRAYING IN PUERTO RICO

P.A. Eng. (R) Gordon R. Christensen returned on January 15th after 3½ months duty in Puerto Rico on the "DDT Residual Spray Project." The object of this project is to test the effectiveness of DDT residual spray in reducing the incidence of malaria. Two towns with generally similar geographic, climatic, and malarious conditions were selected for the project. Playa de Humacao on the east coast was sprayed and Loiza Aldea on the north coast was used as a check. The work is being carried on in cooperation with the School of Tropical Medicine, the Insular Health Department and the Public Health Service District Office.

PROFESSIONAL PERSONNEL

Newly commissioned officers include: San. (R) Ralph S. Howard, assigned to Headquarters; Asst. San. Eng. (R) James H. Crawford, to Louisville, Ky.; Jr. Asst. San. (R) S. Jay McDuffie, to Jackson, Miss.; and Jr. Asst. San. (R) Mixon A. Bankston, to Alexandria, La.

The following officers have been transferred to Headquarters: P.A. Eng. (R) Wesley E. Gilbertson from Honolulu, T.H., to Executive Office; and P.A. San. Eng. (R) Francis A. Jacocks from Washington, D.C.

Transfers include Asst. San. (R) Deed C. Thurman from Chickasha, Okla. to Jacksonville, Fla.; P.A. Eng. (R) Jens A. Jensen from Atlanta to Goldsboro, N.C.; Asst. Eng. (R) Marshall B. Rainey from Manning, S.C. to San Juan, Puerto Rico; P.A. San. (R) Robert E. Serfling from Louisville, Ky. to San Juan, Puerto Rico; Asst. Eng. (R) Sanford Schrank from San Antonio to Texarkana, Texas; Asst. Eng. (R) John R. S. Hill from San Juan, Puerto Rico to Jackson, Miss.; P.A. Eng. (R) Hydrick K. Dickert from Raleigh, N.C. to Austin, Tex.; Asst. San. (R) R. H. Waldrop from Houston to Corpus Christi, Texas; Asst. San. (R) Robert Samuels from Manning, S.C. to Baton Rouge, La.; Asst. San. (R) W. J. Buchanan from Dixon, Ill. to Newton, Ga.; and P.A. San. (R) Willis W. Wirth from Atlanta to Washington, D.C. on temporary duty. Assignment of P.A. San. Eng. (R) Charles I. Mansur from Washington, D.C. is pending.

OFFICERS ON TEMPORARY ASSIGNMENT FROM UNRRA

Five Public Health Service Officers assigned to UNRRA have been detailed to MCWA for training and temporary duty. Upon completion of the In-Service Training course, these officers were assigned as follows: P.A. San. (R) John G. Ault to Jacksonville, Fla.; P.A. Eng. (R) James C. Fisher to Headquarters pending field assignment; Eng. (R) Herbert Haas to Columbia, S.C.; P.A. Eng. (R) L. T. Jodaitis to Austin, Tex.; and P.A. Eng. (R) Silas A. Lacy to Jackson, Miss.

DIVISION NOTES

VEHICLE PROCUREMENT

The procurement of suitable vehicles for use on the Extended Program has been progressing for several months with some 99 vehicles of four types already purchased. Practically all of this equipment was purchased through the Procurement Division from surplus Army stocks, and falls into the following classes:

Panel delivery truck, carry-all type	- 20
½ ton, weapon carrier, 4 wheel drive	- 61
½ ton, ambulance, 4 wheel drive	- 4
½ ton, commercial pickup	- 14
Total	99

Arrangements are now under way to obtain 250 additional vehicles from the Army through a transfer of funds. Tentatively, four types of vehicles will be delivered in the following numbers:

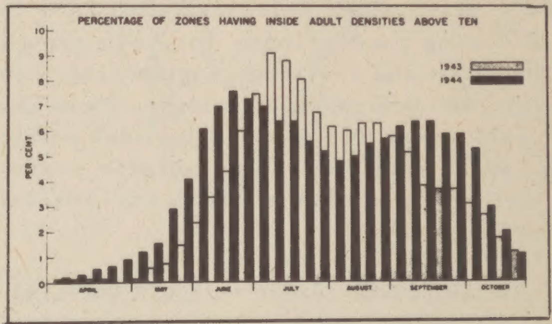
½ ton, carryall, 4 wheel drive	- 25
½ ton, weapon carrier, 4 wheel drive	- 110
½ ton, command car, 4 wheel drive	- 95
½ ton, ambulance, 4 wheel drive	- 20
Total	250

With this total of 349 units, and others which will be available from MCWA representing approximately 30 units, there will be a grand total of 379 vehicles for assignment to the Extended Program.

Unsuccessful efforts were made to obtain pick-up trucks or equal in the 3/4 and 1 ton range from Procurement and the Army. These were desired in order to "round out" the MCWA inventory which consists almost exclusively of ½ and 1½ ton equipment, as it is felt that considerable need exists on power larviciding and drainage projects for vehicles in these intermediate size ranges. Continued search is being made for this type of vehicle.

ENTOMOLOGY

In the Field Bulletin for July, 1944 a chart was included showing the percentage of zones having inside adult densities above ten in 1943 as compared with those for the first half of 1944. At that time it was evident that the 1944 season was 3 weeks to a month earlier than the 1943 season. The completed chart indicates that a second peak occurred in September. Thus the 1944 season not only started earlier but, judging by the percentage of zones with inside densities above ten, it persisted later than did the 1943 season.



DENGUE CONTROL IN HAWAII

No new dengue cases were reported in Hawaii during the months of November and December. Thus it would appear that the epidemic which started in July 1943, reached its peak in October 1943, and infected a total of 1496 people, has been stopped. It is believed that this is the first instance of complete eradication of dengue from a large civilian population largely by mosquito control.

TRAINING DIVISION

Photographs are now set up in a Cardex File catalogued both by subject and by number. Extra copies of many of the pictures are available in the photographic stock room and additional prints may be obtained on order.

Five officers completed the In-service Orientation and Training course during December and January and seven others sat in for short periods between assignments. Films and other training materials were shown to many visitors including representatives of the central office, the Fourth Service Command, and the Tennessee Valley Authority.

The course has been expanded to include a study of all important arthropod vectors of human disease. This aspect is especially designed for officers assigned to foreign duty.

TABLE II

MCWA EXPENDITURES AND LIQUIDATIONS BY MAJOR ITEMS

NOVEMBER 1944

	Continental U. S.	Percentage of Total	Puerto Rico	Percentage of Total
.01 Personal Services	$ 395,646.49	75.10	19,111.68	86.35
.02 Travel	27,963.24	5.32	110.39	.50
.03 Transportation of Things	7,529.44	1.44	------	-----
.04 Communication Services	1,160.32	.23	12.05	.04
.05 Rents and Utilities	2,245.03	.43	------	------
.06 Printing and Binding	910.01	.18	------	------
.07 Other Contractual Services	22,932.90	4.36	------	------
.08 Supplies and Materials	25,281.85	4.81	2,893.95	13.11
.09 Equipment	42,792.54	8.13	------	------
Total	$ 526,461.82	100.00	22,128.07	100.00
Expenses other than Personal Services	130,815.33	24.90	3,016.39	13.65

TABLE III

MCWA PERSONNEL ON DUTY AND TOTAL PAYROLL

NOVEMBER 1944

State	Commissioned		Prof. & Sci.		Sub-Prof. (1)		C. A. F.		Custodial and Per Hour		Total		Percent of Total	
	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay
Alabama	4	993	1	264	3	547	1	164	25	3,605	34	5,573	1.26	1.34
Arkansas	7	2,002	7	2,051	24	5,366	5	915	107	13,202	150	23,536	5.54	5.67
California	4	1,099	---	---	5	1,115	3	622	17	3,473	29	6,309	1.07	1.52
Dist. of Columbia	1	332	---	---	2	378	1	233	---	---	4	943	.15	.23
Florida	6	1,750	4	1,247	21	4,085	6	1,085	165	22,640	202	30,807	7.47	7.43
Georgia	8	2,413	2	527	38	7,457	6	987	92	12,334	146	23,718	5.40	5.72
Illinois	5	1,615	---	---	---	---	3	582	3	667	11	2,864	.41	.69
Indiana	1	284	---	---	---	---	---	---	1	283	2	567	.07	.14
Kentucky	3	1,120	2	537	3	872	1	164	6	1,178	15	3,871	.55	.93
Louisiana	9	2,713	4	1,254	45	8,896	6	1,067	232	33,652	296	47,582	10.94	11.47
Maryland	2	531	---	---	2	385	2	438	12	1,622	18	2,976	.67	.72
Mississippi	6	1,799	5	1,206	9	2,155	4	566	74	9,458	98	15,184	3.62	3.66
Missouri	3	996	---	---	13	2,373	4	768	11	1,831	31	5,968	1.15	1.44
North Carolina	5	1,515	4	1,297	6	1,237	4	726	135	18,047	154	22,822	5.69	5.50
Oklahoma	6	1,617	1	274	12	2,573	1	164	31	4,632	51	9,260	1.89	2.23
Oregon	---	---	1	220	1	202	---	---	---	---	2	422	.07	.10
Puerto Rico	8	2,446	1	297	3	679	5	1,066	313	14,624	330	19,112	12.20	4.61
South Carolina	3	993	5	1,437	29	6,182	5	1,063	262	33,275	304	42,950	11.23	10.36
Tennessee	5	1,552	3	841	5	1,247	3	584	41	5,665	57	9,889	2.11	2.38
Texas	7	1,994	4	1,289	27	5,926	6	1,059	188	25,142	232	35,410	8.57	8.54
Virginia	2	616	2	697	12	2,439	3	602	105	14,044	124	18,398	4.58	4.44
AEDES AEGYPTI														
Alabama	1	284	---	---	8	1,618	1	146	---	---	10	2,048	.37	.49
Florida	1	284	2	547	30	5,701	2	292	---	---	35	6,824	1.29	1.65
Georgia	---	---	---	---	5	1,065	---	---	---	---	5	1,065	.18	.26
Louisiana	1	284	1	284	10	1,936	1	164	---	---	13	2,668	.48	.64
South Carolina	1	284	---	---	10	1,809	1	164	---	---	12	2,257	.44	.54
Texas	3	851	1	129	28	5,280	2	310	5	735	39	7,305	1.44	1.76
Hq. & Dist. (2)	84	27,020	9	2,379	49	9,021	126	21,250	27	3,771	295	63,441	10.90	15.30
Mobile Units	---	---	---	---	1	351	---	---	6	638	7	989	.26	.24
Total	186	57,387	59	16,777	401	80,895	202	35,181	1858	224,518	2,706	414,758	100.00	100.00
Percent of Total	6.87	13.84	2.18	4.05	14.82	19.50	7.46	8.48	68.67	54.13	100.00	100.00		

(1) Includes Entomological Inspectors

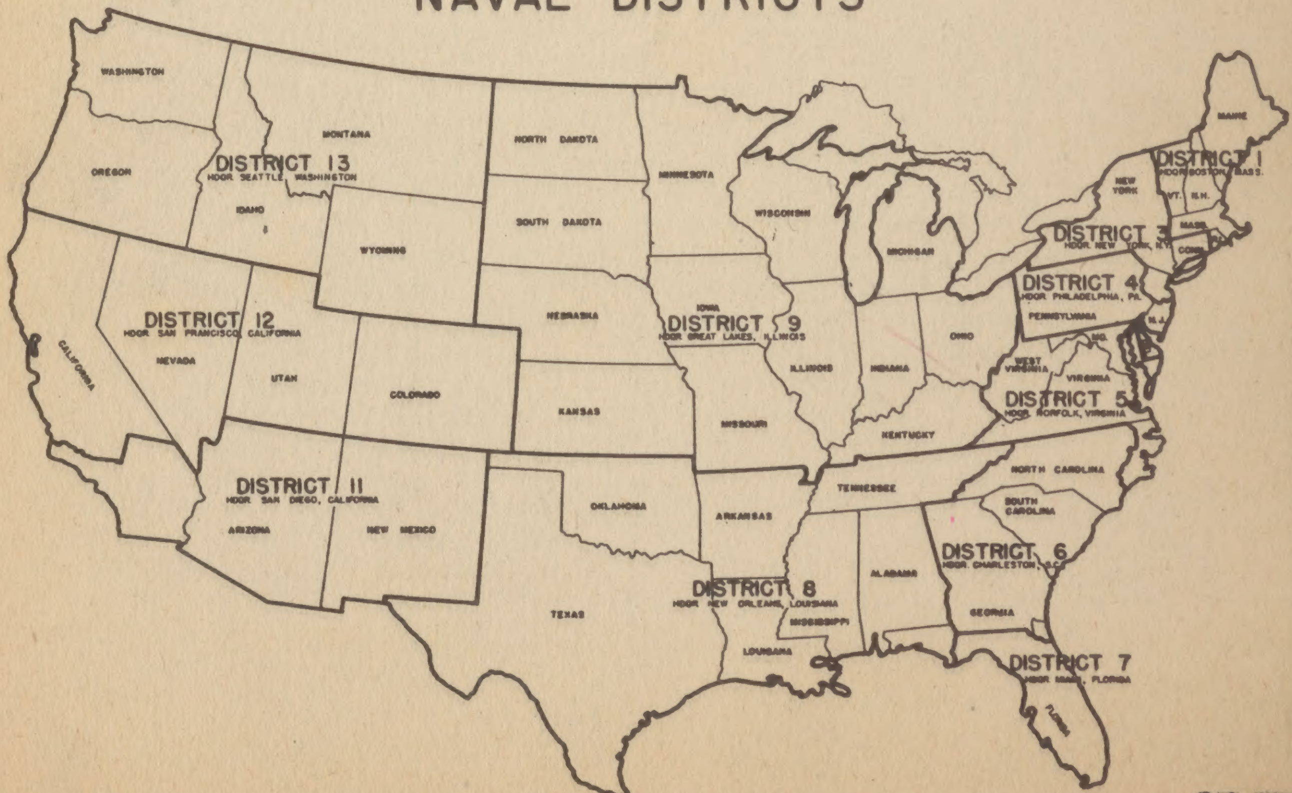
(2) Includes Headquarters and District Offices, malaria survey, Imported malaria control, special investigations, and employees temporarily attached to Headquarters pending assignment to States.

UNITED STATES PUBLIC HEALTH SERVICE

MALARIA CONTROL IN WAR AREAS

UNITED STATES PUBLIC HEALTH SERVICE DISTRICTS

NAVAL DISTRICTS



ATLANTA, GEORGIA